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that the process of deposit was continually going on. He mentioned his discovery of the remains of the floor deposit of one or more extensive caves in the limestone ridge in Wythe Co., Va., which produces largely the ores of lead and zinc. The roof and one side of the caves had been torn away subsequent to the period of deposit of the floor. The latter was of postpliocene age, and contained remains of mammals, birds, reptiles, amphibians, fishes and molluscs chiefly terrestrial. Among the first were tapir, peccary, deer, horse, small carnivora, shrews and several rodents; together, sixteen species. The deposit extended eight miles in length.

He also announced the existence of a postpliocene deposit in Charles Co., Maryland, near the Patuxent river, as indicated by the remains of the common peccary, a *Manatus* and a new carnivore of the genus *Galera*.

December 17th.

The President, DR. HAYS, in the Chair.

Twenty-three members present.

December 24th.

The President, DR. HAYS, in the Chair.

Sixteen members present.

The following papers were presented for publication:

"A Review of the species of *Amblystoma*." By E. D. Cope.

"On the Genera of fresh-water Fishes *Hypsilepis*, Baird, and *Photogenis*, Cope, their species and distribution." By E. D. Cope.

"On the Distribution of fresh-water Fishes in the Alleghany Region of south-western Virginia." By E. D. Cope.

"*Fasti Ornithologiæ*." No. III. By John Cassin.

The deaths of the following members were announced: Mr. Jacob Pierce and Mr. Richard M. Marshall; also Dr. Chas. Zimmerman and Rev. Dr. C. Dewey, Correspondents.

December 31st.

MR. VAUX, Vice-President, in the Chair.

Twenty-seven members present.

On favorable reports of the Committees, the following papers were ordered to be published:

An addition to the VERTEBRATE FAUNA of the Miocene period, with a synopsis of the extinct CETACEA of the United States.

BY E. D. COPE.

The species below enumerated were collected by James T. Thomas near his residence in Charles county, Maryland, not far from the Patuxent river, in the beds of the Yorktown epoch, in places where they are exposed by the cutting of various streams. The localities are twenty miles to the eastward of the outcrop of the eocene beds, and as those of the pliocene are at a considerable distance eastward of the eastern shore of the Chesapeake Bay, it is scarcely probable that there is any admixture of specimens from those formations. Two species in the collection of *Galera* and *Dicotyles* genera at present existing in South America,—the latter within our own limits also,—indicate the existence

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of a post-pliocene deposit in the neighborhood, which has not been hitherto recognized.

In the miocene region, the beds of shells are of considerable thickness, and are composed of immense numbers of closely packed individuals of many species, in a very good state of preservation. They are, however, less silicified, and therefore more friable than those of the great beds at Yorktown.

The before-mentioned collection, which is now in the museum of the Academy, contained the following species of molluscs, etc., for the identification of which I am indebted to my friend T. A. Conrad :

<i>Madrepora palmata</i> Goldf.,	<i>Cyclocardia granulata</i> ,
<i>Orbicula lugubris</i> ,	<i>Carditamera protracta</i> ,
<i>Ostrea trachydiscus</i> , Con., sp. nov.,	<i>Astarte exaltata</i> ,
<i>Ostrea thomasi</i> , Con., sp. nov.,	<i>Astarte undulata</i> ,
<i>Anomia multilineata</i> ,	<i>Astarte cuneiformis</i> ,
<i>Chama corticosa</i> ,	<i>Astarte perplana</i> ,
<i>Isognomon tortum</i> ,	<i>Mercenaria staminea</i> ,
<i>Pinna</i> ,	<i>Mercenaria cuneata</i> , Con., sp. nov.,
<i>Pecten madisonius</i> ,	<i>Lucina americana</i> ,
<i>Pecten jeffersonius</i> ,	<i>Lucina foremani</i> ,
<i>Pecten humphreysii</i> ,	<i>Lucina contracta</i> ,
<i>Pecten marylandicus</i> ,	<i>Dosinia acetabulum</i> ,
<i>Pecten clintonius</i> ,	<i>Dione staminea</i> ,
<i>Pecten virginianus</i> ,	<i>Dione marilandica</i> ,
<i>Pecten cerinus</i> , Con., sp. nov.,	<i>Pliorhysis centenaria</i> ,
<i>Axinæa lentiformis</i> ,	<i>Sphærulea subvexa</i> ,
<i>Arca callipleura</i> ,	<i>Metis biplicata</i> ,
<i>Arca improcera</i> ,	<i>Glycimeris americanus</i> ,
<i>Noëtia carolinensis</i> ,	<i>Fissurella redimicula</i> ,
<i>Corbula idonea</i> ,	<i>Zizyphinus bryanii</i> , Con., sp. nov.,
<i>Corbula pectorosa</i> , Con., sp. nov.,	<i>Lunatia catenoides</i> ,
<i>Cardium laqueatum</i> ,	<i>Scala pachypleura</i> , C.,
<i>Isocardia markoii</i> ,	<i>Turritella indenta</i> , C.,
<i>Isocardia fraterna</i> ,	<i>Turritella alticostata</i> ,
<i>Crasatella undulata</i> ,	<i>Ephora quadricostata</i> ,
<i>Crasatella melina</i> ,	<i>Bursa centrosa</i> , Con., sp. nov.,
<i>Crasatella marylandica</i> ,	<i>Balanus vulcanellus</i> , Con., sp. nov.,
	<i>Balanus proteus</i> .

ELASMOBRANCHI.

ÆTOBATIS, Müll., Henle.

ÆTOBATIS ARCUATUS, Agassiz, Poiss. Foss. iii. Gervais, Palæont. Française, Tab.

This species, figured by Gervais, has existed in abundance during the period of deposit of the miocene beds. Two or three other species of the genus have left their remains in the same, which will be characterized at some future time.

ÆTOBATIS PROFUNDUS Cope, sp. nov.

This species is represented by numerous separated plates of the inferior dental series. They are therefore curved, and attached to their laminiform roots at a strong angle. The species was smaller than the preceding, judging by the portions preserved. The band-like teeth differ in their masticatory surface being convex or rounded, not plane, and having a much less projecting and lip-like convex margin. Their curvature is less, and does not approach the angulation of the *A. arcuatus*, and the width is nearly uniform at all points, and not narrowed at the extremities as in the latter. The laminar portion is relatively longer, having therefore a more extensive imbrication.

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	Lines.
Length of convexity of perfect tooth.....	21.5
“ of chord “ “	16.75
Depth of laminar series.....	6
Width of masticatory surface	2.75

MYLIOBATIS Cuvier.

The following are the first species of this genus which have been determined from the miocene age in the United States :

MYLIOBATIS GIGAS Cope.

This species is remarkable for the transverse extent of its median teeth, and its strong antero-posterior curvature. The latter is greater than the transverse curvature, which consists in the slope of the lateral dental series and of the extremities of the median teeth. Lateral teeth longer than broad, convex, in two rows. Median teeth well arched horizontally, but straight in their median portions, the length one-seventh the (straight) width.

Total length 3 in. 8 lines ; width of median series 3 in. 2.5 lines. Sutures straight ; surface smooth. (Remains of two or three individuals in the collection.) Should the proportions of this species have been similar to those of the *M. aquila* of the Mediterranean, the extent of its pectoral fins would have been not less than nine feet.

MYLIOBATIS PACHYODON Cope.

This species, also of large size, approaches near to the *M. holmesii* Gibbs, and *M. reglianus* Agassiz. It differs from the former in its median series of teeth being transverse and scarcely curved, and in the inferior laminae being without V-like grooves ; and from the latter in the depth of median teeth being half deeper in relation to the length, and in their greater transverse convexity. The specimen on which the species is founded consists of the lateral portions of four median and the single row of lateral teeth. The great depth of the vaso-dental layer is only equalled in the *M. holmesii*. The *M. stokesii* Agass. and *M. micropleurus* Agass., which resemble it in some particulars, differ in possessing two lateral series of teeth.

The lateral teeth are larger than broad.

	Lines.
Longitudinal width of median tooth band.....	5.25
Depth of vaso-dental layer.....	7.75
“ of lamellar layer.....	2.75

The transverse extent of the plate to a point which appears by the inferior curvature to be the middle, is 16 lines ; the series has therefore probably been narrow.

MYLIOBATIS VICOMICANUS Cope.

Specimens of two individuals represent this species, which is of somewhat smaller dimensions than the two preceding, though one of the large species. One plate, extending over twelve median teeth, is flat antero-posteriorly, and nearly so transversely ; the sutures of the median teeth slightly concave medially, and strongly convex at their extremities. Two lateral rows of teeth, which are longer than broad. Sutures straight. Vaso-dental layer shallow ; where worn down in an old specimen, the surface is punctate all over through the section of the vascular canals.

	In.	Lin.
Total length of specimen.....	3	2.5
Transverse length of median teeth.....	2	3.75
Length of median teeth.....		3.75
Depth of vaso-dental stratum.....		4.5

In the preceding three species the series of attaching laminae are arranged in series oblique to the base of each tooth.

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RAJA Linnæus.

RAJA DUX Cope.

This species is represented by a dermal plate, which was originally covered by enamel, and probably supported a spine; the latter, and a considerable portion of the former, have been lost. The form is unsymmetrically subpentagonal, longer than broad. One extremity truncate, the other obtusely narrowed. Inferior surface concave flattened; superior rising to a small median plane, edges thin. Greatest elevation near the narrow extremity, where the spine stood; a groove extends from the position of the latter to the margin. Surface indistinctly ribbed at right angles to the margin. Enamel with slightly wavy ribs, those near the centre much coarser than those near the circumference. Length of plate 15 lines; greatest width 12.75 lines; greatest depth 4 lines. A second plate, perhaps of the same species, differs in its narrower form; it is without enamel.

This ray was larger than any described from European tertiary.

NOTIDANUS Cuv.

NOTIDANUS PRIMIGENIUS Agassiz, Gibbes.

Fourteen teeth.

NOTIDANUS PLECTRODON Cope, sp. nov.

This species is represented by nine teeth, which are quite characteristic. It presents fewer denticles than any other species, and thus approaches distantly the *N. recurvus* of Agassiz. Large denticles but two, leaning obliquely in the plane of the root; the external denticle one-fifth the size of the median. Median denticle twice as high as broad at the basis, little inclined from the plane of the root; the cutting edge curved. Serrate edge very short, basal, in one specimen with no, in another four denticles. Section of root wedge-shaped.

	Lines.
Length of root.....	8.75
Elevation of longest denticle.....	6

Four teeth which I refer to a median position in the jaws of this species, have no lateral cusps whatever, but approximate those of some species of *Lamna* in form. Crown rather slender, subcylindric and slightly constricted at the base of the enamel, which is convex vertically and transversely at that point. This convexity is very strong to the apex of the tooth; the other side is still more convex. The crown is also very oblique in one or both directions. It is perfectly smooth, with lateral cutting edges. The latter disappears on the inner basis of the largest and most curved specimen. The enamel does not descend low on the outer face in the largest specimens. Tip little compressed; narrowed. Greatest length, 8.25 l.; of crown, 6.25; of root transversely, 6 l.

GALEOCERDO Müll., Henle.

GALEOCERDO APPENDICULATUS Agass.

GALEOCERDO LATIDENS Agass.

GALEOCERDO ADUNCUS Agassiz.

GALEOCERDO CONTORTUS Gibbes.

GALEOCERDO EGERTONI Agass.

GALEOCERDO ? sp. aff. contorto.

GALEOCERDO LEVISSIMUS Cope, sp. nov.

This species is indicated by a large number of teeth. It is of the type of *G. aduncus*, but is characterized by the shortness of the root transversely as compared with the elevation of the crown, the convexity of the inner face of the latter, and the total absence of denticulations in any portion. The crown is oblique, the inner margin vertical in nearly all the specimens, the basal cut-

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ting edges short. The upper margin is not turned outwards, as in *G. contortus* Gibbs, and the section of both inner and outer faces everywhere convex. Base of the enamel inside either convex or plane; outer basis rising on the crown. Axis of medium spec. 5.25 l. Transverse extent of same, 6.75 l.

The apex of the crown is not nearly so oblique as in *G. aduncus*, though the specimens are, as in other species, more or less oblique or depressed, according to the position in the mouth. The species appears to be well marked.

SPHYRNA Rafin.

SPHYRNA PRISCA Agass.

SPHYRNA ? spec.

SPHYRNA MAGNA Cope.

This species resembles in its dentition a small *Oxyrhina*, with the basal portion much prolonged laterally, and crenate. The crown in the specimens is slightly to markedly oblique, rather narrow and stout, slightly bent outwards, with sharp, and entirely smooth cutting edges. Both faces are convex, the outer much so, the inner with a slight groove at base. The root rather short, slightly concave below, and prominent behind. The basal portion bounding the least angle is separated by an incised notch. One specimen is larger, more oblique, and with longer basis. Total elevation of medium specimen 7 lines; basis of same 6.5 lines. Larger specimen, axis, 7.8 lines; basis, 9 lines.

HEMIPRISTIS Agass.

HEMIPRISTIS SERRA Agass.

CARCHARODON Smith.

CARCHARODON ? ANGUSTIDENS Agass.

CARCHARODON MEGALODON Agass.

OTODUS Agass.

OTODUS OBLIQUUS Agass.

OTODUS APPENDICULATUS Agass.

OXYRHINA Agass.

OXYRHINA XIPHODON Agass.

OXYRHINA HASTALIS Agass.

OXYRHINA DESORII Gibbs.

OXYRHINA SILLIMANII Gibbs.

OXYRHINA MINUTA Agass.

LAMNA Cuvier.

LAMNA HOPEI Agass.

LAMNA DENTICULATA Agass.

LAMNA ELEGANS Agass.

LAMNA CUSPIDATA Agass.

LAMNA ? SUBULATA Agass.

TELEOSTEI.

SPHYRÆNA Cuv.

SPHYRÆNA SPECIOSA Leidy, Proc. Acad. Nat. Sci. 1856, p. 221.

TESTUDINATA.

TRIONYX Geoffr.

TRIONYX CELLULOSUS Cope.

Two small fragments of the carapace are all that represent this species. The sculpture is, however, exceedingly characteristic, and different from that of any either recent or fossil species known to the writer.

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The surface is marked by numerous closely placed pits, which are remarkably deep, producing the vesicular appearance of scoria. The resemblance is heightened by the irregular size of the pits. Edges of septa rounded. The fragments are unusually thick, indicating a species of large size.

	Lines.
Width of free portion of rib at origin.....	7.5
Depth of portion of carapace.....	4.33

TRIONYX sp.

An uncharacteristic portion of the carapace, which exhibits larger and more regular pits, separated by wider partitions. The pits at one extremity are larger than those of the other, and the septa narrower.

CHELONE Brongt.

CHELONE sp.

A proximal portion of the costal plate has a thickness of three lines, but rapidly thins out. Its surface exhibits transverse rugæ at its proximal extremity; elsewhere the rugæ are longitudinal, and more distinct on one side than the other.

CHELONE sp.

Two fragments of the carapace of a large and convex species, each with a strongly marked groove for the margin of the dermal shields. The surface is without sculpture.

CROCODILIA.

THECACHAMPSA Cope.

This genus resembles *Crocodilus* L., but differs in the entire hollowness of the external stratum of the crowns of the teeth, and their composition of closely adherent concentric cones. These internal cones, which number at least three, may be homologous with the included crowns of the successional teeth of other *Crocodylia*, but they must be regarded as functional in a physiological sense, since they compose the bulk of the crown of the tooth, within. They resemble in this respect *Mosasaurus*, and probably represent a genus near the *Mosasauridæ*. In none of the specimens at my disposal is the root preserved, though the width of the basal margin of the crown in *T. contusor* indicates its probable existence.

THECACHAMPSA CONTUSOR Cope.

This species is established on a single tooth. It is remarkable for its short conic form. The basis is circular, and its diameter is three-fifths the length of the tooth. The apex is rather acute and circular in section; it is directed to one side, and the tooth is slightly flattened on the inside of the curve. This face is bounded by a low obtuse ridge on each side, for the basal two-thirds of the crown, which are not distinguishable from a series of ridges which mark, at distances of a line, the basal three-fifths round the crown; they are less distinct on the convex aspect, and are separated by concave surface. Instead of the cutting ridges of the genus *Crocodilus*, the apex is provided with a narrow flattened plane on each side. The surface of this portion, and of much of the convex face, is marked by a minute decussating or chevroned sculpture. Vertical length, 14.5 lines; diameter of base of crown, 8.5 lines.

THECACHAMPSA SERICODON Cope.

This species is based on a number of specimens of elongate conic crowns, which resemble to a considerable extent those of *Crocodilus antiquus* Leidy, of the same epoch. They differ from the *T. contusor* in their more compressed and elongate form, the presence of a sub-acute ridge on each side the apical three-fifths the crown, the absence of the lateral grooves, and the chevron sculpture. They are, on the contrary, minutely striate, and possess a silky lustre.

Length of medium specimen, 16.5 lines; base of crown, 9 lines.

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CETACEA.

Premising that a number of species whose remains occur in the present collection must, for the present, be passed by, I append a list of the extinct Cetaceans described from North American formations, up to the present time:

BALÆNIDÆ.

BALÆNOPTERA PRISCA Leidy, Cope, miocene. Pr. A. N. S. 1851, 308.

ESCHRICHTIUS CEPHALUS Cope, miocene.

ESCHRICHTIUS LEPTOCENTRUS Cope, miocene.

? *BALÆNA PALÆATLANTICA* Leidy, miocene. Pr. A. N. S. 1851, 308.

DELPHINIDÆ.

BELUGA VERMONTANA Thompson, Champlain. Nat. Hist. Vermont.

DELPHINUS CONRADI Leidy, miocene. Pr. A. N. S. 1853, 35.

LOPHOCETUS CALVERTENSIS Harlan, Cope, miocene. Trans. Nat. Acad.

PRISCODELPHINUS HARLANI Leidy, miocene. Pr. A. N. S. 1851, 327.

PRISCODELPHINUS ACUTIDENS Cope, miocene.

PRISCODELPHINUS GRANDÆVUS Leidy, miocene. Pr. A. N. S. 1851, 327.

RHABDOSTEUS LATIRADIX Cope, miocene.

CATODONTIDÆ.

ORYCTEROCETUS CORNUTIDENS Leidy, miocene. Pr. A. N. S. 1853, 378.

ORYCTEROCETUS CROCODYLINUS Cope, miocene.

PHYSETER ANTIQUUS Leidy, pliocene. Pr. A. N. S. 1853, 378.

ONTOCETUS EMMONSII Leidy, miocene. Pr. A. N. S. 1859, 162.

CYNORCIDÆ.

CYNORCA PROTERVA Cope, miocene.

SQUALODON DEBILIS Cope, pliocene.

SQUALODON WYMANII Cope, miocene.

SQUALODON MENTO Cope, miocene.

SQUALODON HOLMESII Leidy, pliocene.

SQUALODON ATLANTICUS Leidy, miocene.

BASILOSAURIDÆ.

DORYODON PYGMAEUS Cope, eocene.

DORYODON SERRATUS Gibbes, eocene.

BASILOSAURUS CETOIDES Geinitz, eocene.

Descriptions and notes on many of the preceding are given below.

ORYCTEROCETUS Leidy.

This genus differs from *Physeter* in the extensive pulp-cavity of the teeth, and the absence of surface cementum.

ORYCTEROCETUS CROCODYLINUS Cope.

This species is based on a tooth belonging to an individual of one-third or one-fourth the size of the known species *O. cornutidens* Leidy, but nevertheless adult, as attested by the obliquely worn apex of the crown. The general form is that of an elongate curved cone, with flattened sides, and a broader convex face within the curve, and a narrower one on the outside. The tooth

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is marked by numerous irregular transverse lines, similar to those frequently marking growth, and by longitudinal shallow grooves. The pulp-cavity extends for two-thirds the length of the tooth, being thus relatively deeper than in the known species, and is also very large, thinning the external wall out to an open basis. In the known species the walls are relatively thicker, and for a considerable distance parallel to each other. The form of the tooth is in some degree similar to the crown of the canines of some crocodiles. There is no enamel on the teeth of Cetaceans of this genus.

Total length, 2 inches 5 lines; long diameter at base, 8.25 lines; diameter at middle, 6 lines.

RHABDOSTEUS Cope.

This genus is either referable to a family not yet characterized, allied to the *Platanistidæ* and *Delphinidæ*, or belongs to the first named of these recent families.

Premaxillary and maxillary bones forming a cylinder, bearing teeth on its proximal portion, and prolonged in its distal portion into a slender straight beak. Teeth with the enlarged crown separated from the fang by a constriction.

This is one of the most remarkable genera of Cetaceans, and may be compared to its affines as *Xiphias* is to other *Teleostei*.

RHABDOSTEUS LATIRADIX Cope.

A portion of the muzzle of this species, which is preserved, measures 12 in. 7.5 lines in length, 12.5 lines in transverse, and 11 lines in vertical diameter at the base. The superior edge of the maxillary bone forms the external outline, while the remainder of this element is entirely inferior. The palatine face is convex, and the alveolar series approximated. The alveolæ themselves are longitudinal, two in .75 of an inch, and separated from each other by spongy septa. The vomer does not appear in the portion of the muzzle at my disposal.

Width of premaxillary	Lines. 6
“ superior face maxillary.....	4.75
“ palatine face of maxillary	4.5

Three teeth are referred, with much probability, to this species. The fangs are from equal to twice the length of the crowns, and are much compressed, widening downwards, and more or less prolonged at one inferior angle, in the same plane. The crown, compressed transversely to the root, and expanded above the base, straight or slightly curved in the direction of its plane. Enamel smooth, edges obtuse. The compressed fang corresponds to the longitudinal alveolus, while the transverse dilatation of the crown is similar to the form of those of *Platanista*.

Length of largest specimen.....	Lines. 12
“ “ crown	5
Width of fang.....	3

Jas. T. Thomas, the discoverer of this Cetacean, tells me that he has seen portions of the muzzle between two and three feet long. From the gradual acumination of the individual here described, the length of the muzzle alone might have been at least of that length. A slender piece, evidently a portion of the premaxillary of a smaller individual, is fourteen inches in length. Its posterior portion is deflected, as if to give place to the prenasal triangle, and its inner margin descends abruptly to the same.

PRISCODELPHINUS Leidy.

In this genus the muzzle is elongate and flattened, and furnished with cylindrical fanged teeth, which extend throughout much or all of its length. The symphysis mandibuli is very elongate. The teeth have not been described. *Delphinus canaliculatus* von Meyer, from the Swiss Tertiary, appears to belong to it. (*Palæontographica*, 1856, p. 44).

PRISCODELPHINUS ACUTIDENS Cope.

This species is represented by a single tooth, which is apparently that of an adult of much smaller size than either of the known species of the genus. The fang is straight, fusiform, and cylindrical in section. It is constricted immediately below the crown. The latter is curved conic, the face within the curve bounded on each side by a low but acute ridge, which extends from near the acute apex to near the base. Enamel polished, smooth. Extremity of fang acute, solid.

Total length 7 lines; length crown 3.2 lines; diameter of base crown 1.4 lines.

LOPHOCETUS Cope.

Temporal fossa truncated by a horizontal crest above, prolonged backwards and bounded by a projecting crest, which renders the occipital plane concave. The same crest prolonged upwards and thickened, each not meeting that of the opposite side, but continued on the inner margins of the maxillary bones, turning outwards and ceasing opposite the nares. Front, therefore, deeply grooved. Premaxillaries separated by a deep groove. Teeth with cylindric roots.

LOPHOCETUS CALVERTENSIS. Delphinus calvertensis Harlan. *Pontoporia calvertensis* Cope, Proc. Acad. 1866.

This species is near to the *Pontoporias*, but differs as above, so as to be referable to another genus. The form of the occiput indicates the insertion of powerful muscles, a condition which does not exist in any of the true Cetacea within the knowledge of the writer, excepting in *Inia* and in *Arionius*, von Meyer, from the Swiss Miocene. The latter genus resembles it also in the superior truncation of the temporal fossæ, but here all similarity ceases, for in *Arionius* the frontal bones are well developed, while in *Lophocetus* they are, as in true *Delphinidæ*, mere narrow transverse wedges. They are, indeed, much less developed than in *Pontoporia*, or even than in *Inia*.

The resemblance to *Inia* is closest. The only feature which renders a generic distinction certain is the cylindric form of the posterior alveolæ, which renders it probable that the teeth were not furnished with lobes as in *Inia*. In the latter the fangs have a transverse dilatation to support these. Harlan also states that but one and a half inches of the muzzle are broken away. If this be the case, the genus is short-muzzled and with the symphysis mandibuli not elongate. This is, however, exceedingly doubtful.

In *Lophocetus calvertensis* the nasal bones are separated by a deep fissure. The maxillaries exhibit, on each side in front of the external nares, two oval, roughened surfaces, which converge behind the nares. These appear to be insertions, perhaps for cartilaginous crests, comparable to the bony roofs of *Platanista*, less probably, for muscles connected with the external meatus.

The form of the muzzle is not as elongate as in the known species of *Pontoporia*, and it is much expanded, proximally, instead of contracted, as in the latter.

This dolphin approximated the larger white whales (*Beluga*) in size.

ESCHRICHTIUS Gray.

The genus *Megaptera* Gray embraces species of large size, living in the recent seas, known as the hump-backed whales. There are six species known, from different seas, of which one, *Megaptera osphya* Cope, occurs on the Atlantic coast of the United States. An examination of some specimens of periotic bones and vertebræ, from near Yorktown, Virginia, first indicated to the writer the existence of a supposed species of the genus, in the Miocene period, and it was mentioned in these Proceedings, 1865, 180. In the present collection the remains of an allied or the same species are preserved. These are, the premaxillary bones, nearly complete; the rami of the mandible, nearly

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perfect; the first, third, fourth, fifth and seventh cervical vertebræ; several caudal and lumbosacral vertebræ, humerus, ulna, carpal bones and phalanges. The attachment of the epiphyses everywhere, indicate an adult animal.

In the genus *Megaptera* the transverse processes and the parapophyses of the second and succeeding cervical vertebræ are always separate, and not united at their extremities. Those of the second are usually very broad at their origins. The gular region is folded, and there is a knob on the back, representing the dorsal fin of the finner whales.

The above-named specimens, however, appear to belong to the genus *Eschrichtius*, recently established by Dr. Gray. It is near to *Megaptera*, differing technically in the presence of an acromion* on the scapula. As this piece is wanting, I rely on another feature pointed out by Gray, the great size of the neural canal, as compared with the vertebral centra. In the fin-backed whales, *Balænoptera* (*Balænoptera* and *Physalus* Gray), this author states its diameter to be not more than half that of the body; in the specimens before me it measures from six-sevenths to over two-thirds the latter, thus resembling the *Eschrichtius robustus*. It also exhibits the same affinity by the small size of the coronoid process.

Before considering the species from the Thomas collection, another species previously represented in our Museum may be noticed.

This, a second cervical vertebra from the Miocene of Eastern Virginia, differs from that of any known species in the slenderness and depressed form of its parapophyses, and in its transversely parallelogrammic form. It is without epiphyses, and is therefore part of a young animal, but when compared with the third cervical of the adult specimen above alluded to, is considerably larger. The vertical depth is the same in the two, but the transverse diameter of the Virginia specimen is 1.5 inches greater. The parapophyses are also nearly transverse in the latter; in the Maryland specimen, directed downward at 45° from the horizontal. I record it at present as—

ESCHRICHTIUS LEPTOCENTRUS Cope,

Since it is not likely to have pertained to the species already described† by Leidy, *Balænoptera prisca* and *Balæna palæatlantica*. The former was described from a portion of a mandibular ramus, which, when restored, would have measured 4.75 feet in length, giving a total length of 21 feet. As there are no evidences of immaturity in the specimen, it is probable that its size was not greater than, if as great as, the existing *Balænoptera rostrata*.† Its affinity to this species is confirmed by the slender proportions, and great external convexity of the ramus. Its superior and inferior aspects are broad and nearly similar. The species is well distinguished. The *B. palæatlantica* is based on a portion of the mandible of an individual of not more than thirty-five feet in length. The inner face is more convex than in the last, and more so than in any known *Megaptera*. It also presents the peculiarity of two rows of vascular foramina, closely approximated on each side of the superior median ridge; this has not been observed in that genus or *Eschrichtius*.

The species from Maryland is near thirty-five feet long, according to the usual estimate. The *E. leptocentrus* has no doubt attained a considerably greater size, since its cervical vertebra is longer, and is that of a young individual. It will not be unsafe to ascribe to it a length of 50 feet.

	In.	Lin.
Transverse extent of centrum.....	6	
Vertical diameter.....	4	
Length of body (below, with epiphyses restored).....	1	8-75
Distance between origins of dia- and parapophyses.....	2	3

* The genus *Poescopia* (?) Gray, established for hump-backed whales with a coracoid process, does not seem to differ from *Megaptera*, where that process sometimes occurs.

† A fine specimen of this species, over 30 feet long, went ashore during the autumn of 1866, on the Long Beach, N. J. It was much injured, probably by the killers. This species has not been before noticed on our coasts.

	In.	Lin.
Vertical depth odontoid elevation (under epiphysis).....	2	5
Superior width " " " "	1	10
Diameter base of dia- and neurapophysis.....	7	5
" " " " (in part estimated).....	4	10

ESCHRICHTIUS CEPHALUS Cope, sp. nov.

The species whose remains are above alluded to as having been preserved by Jas. T. Thomas.

The atlas of this species most nearly resembles among existing Cetaceans the *Balænoptera rostrata*, in the width of the neural canal above, and the inferior position of the diapophysis and cotyloid articular face. That most essential point, the form of the dia- and parapophyses of the second cervical, not being attainable, owing to the absence of that piece, it becomes necessary to decide on the real relations to the *B. rostrata* on other grounds. The lack of elevated coronoid process of the mandible contradicts this affinity, while the narrowness and steeply descending angle of the parapophyses of the third cervical render it very improbable that the dia- and parapophyses of the second were united, if they observed their usual parallelism. This is confirmed by the fact that they are not united in the *E. robustus* Lillg.; though the parapophyses of the third have in it an almost transverse direction.

This species may be compared with the known species of this genus, and of Megaptera, as follows:

The third and fourth cervical vertebræ exhibit the quadrate form attributed to the *E. robustus* and *M. lalandii*, and the above-described *E. leptocentrus*. The form of the centra in *M. longimana* and *M. osphya* is more ovate.

The parapophyses of the third cervical are flattened in the plane of the centrum; their axes are continuous with those of the combined dia- and neurapophyses, and the connecting lines cross at a superior angle of 50°. In the *E. robustus* these processes have a transverse direction, according to Liljeborg. In the fourth cervical of the miocene species, the parapophyses have a still more vertical direction. The fifth and seventh cervicals are prominently rounded below, a feature not seen in the *M. lalandii* and *E. robustus*, and neither of them possess parapophyses. The floor of the neural canal is convex in all the cervicals, most strongly in the posterior. In *E. robustus* it is plane in Gray and Liljeborg's figures; they are similar in the *E. leptocentrus* and in the Megaptera. The neural arches are more or less broken away, but enough remains in the third to give the width of the neural canal. The diapophyses of the fifth and seventh are directed backwards, and the bodies of all are convex in the same direction.

The atlas is notable for the want of a neural spinous crest, and in the inferior position and obliquity of the cotyloid cavity. The latter are separated by an inch below; in the same interval behind there is a transverse, very obtuse *tuberculum atlantis*. The inferior portion of the perforation, or *foramen dentati*, is much narrower than the neural arch.

	In.	Lin.
Vertical depth of atlas.....	6	5.3
" " " perforation..	3	9
Total width of atlas (exclus. diapophysis).....	8	2
" " " articular cotylus.....	3	8
Greatest transverse thickness atlas above.....	2	4.5

The diapophysis is compressed, its base oblique, descending in front. The neural arch on each side is at right angles to the long diameter of the articular faces.

	In.	Lin.
Diameter of centrum third cervical..	4	7
" " " parapophysis at base.....	1	2.5
" " " neur. diapophysis at base.....	1	2.5

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Diameter of neural canal (greatest).....	4
Depth centrum.....	4 1
Length ".....	9.5
Transverse diameter of fifth cervical.....	4 9
" " " neur. diapophysis.....	1 6.5
Vertical " ".....	4 5.5
Length centrum.....	10.5
Transverse diameter seventh cervical.....	5 3
" " neur. diapophysis.....	1 8
Vertical " centrum.....	4 5
Length centrum.....	1 2
" " of an interior caudal.....	5 2
Vertical diameter of anterior face.....	4 9
Transverse " " ".....	5 7.5
Height neural spine (worn).....	1 7.5
Length diapophysis (worn).....	1 7.5
Width of inferior concavity.....	1 8

The caudal vertebra measured has the elongate form of those of the Balænopteras, and two strong inferior ridges, separated by each other by a deeper, and from the diapophyses by a shallower concavity.

A considerable portion of both premaxillary bones preserved shows an elongate muzzle; their form is narrow, especially towards their distal extremity, where they are much flattened; for a short distance posterior to that point they are subcylindrical and grooved.

	Ft.	In.
Length preserved (proximal end wanting).....	6	8
Width near proximal end.....		3.5
" " distal.....		2.5

The mandibular rami are massive, moderately curved, and considerably compressed, especially on their distal fourth. The interior face is everywhere nearly flat, the exterior convex; the superior ridge is rather acute; the inferior aspect obtuse, narrow. A series of large distant vascular foramina extend along the outer face some distance below the superior ridge. The coronoid processes have been broken off; their bases would indicate that they were compressed, and not elevated.

	Ft.	In.
Length of jaw to opposite coronoid.....	7	0.5
Total length (restored after <i>E. robustus</i>).....	9	4.5
Depth one foot from extremity.....		4.8
" two feet in advance coronoid proc.....		8

The great length of the ramus as compared with the size of the cervical vertebrae is a remarkable feature. In two not distantly related species, following, they are:

	Diam. vertebrae.	Ramus.	Total.
<i>Eschrichtius robustus</i> (3d c.).....	8.75 in.	8f. 2 in.	47
<i>Megaptera longimana</i> (1st d.).....	8.5	10.7	34.6
<i>Eschrichtius cephalus</i> (7th c.).....	5.25	9.4	31

The proportion of the last cervical to the ramus is probably one-fourth less in the new species than in the second-named, and it might therefore be supposed that the head would bear a greater proportion to the total length than in *Megaptera longimana*, and thus approach the *Balæna mysticetus*. This great proportion is reduced by the indications furnished by posterior vertebrae which have the elongate form of those of the Balænopterae. This point being opposed to the other, it seems probable that the proportions most nearly approached those of the *B. longimana*, as above estimated, and that while this Cetacean possessed a larger head than the *Eschrichtius robustus*, its absolute length was less.

The form of the anterior limb presents us with a striking peculiarity of this 1867.]

species. It was remarkably short, approaching the species of *Balæna*, and differing from *E. robustus*, still more from the *Sibbaldii* and *Balænoptære*, and most from *Megaptera longimana*.

	In.	Lin.
Length humerus.....	11	8
Least width.....	4	4
Distal ".....	5	3
Length radius (straight line).....	15	5
Proximal width.....	3	6
Distal ".....	4	

The humerus is flattened in one plane, and has an elevation near the middle of the infero-posterior margin, for muscular insertion. The shortness of the limb is a consequence of the small size of the radius and ulna.

Two carpals and one phalange are preserved. The former are as deep as wide, oval; one longer, and composed of two united centres of ossification.

	In.	Lin.
Length of longest carpal.....	2	6
" " phalange.....	3	2
Width " ".....	2	3

In conclusion it may be asserted that a rather more than usually fortunate coincidence in the preservation of important parts of the skeleton has enabled the writer to explain with some degree of accuracy the characteristics of this monster of the deep, almost the largest mammal of the miocene period yet known, but few of whose fellow leviathans have been as yet indicated by fragments only.

SQUALODON Grateloup.

Van Beneden Ac. Roy. Belg. 1865. *Phocodon* Agass., *Crenidelphinus* Laurill. *Macrophoca* Leidy, *Delphinoides* Pedroni, *Champsodelphis* Gervais.

This remarkable genus of Cetaceans, at one time supposed to be identical with the *Basilosaurus* (Harlan), has recently been greatly elucidated by the investigations of Prof. Van Beneden of the University of Louvain. The discovery of remains of more than one allied species in the neighborhood of Antwerp was the immediate stimulant to these researches. Jourdan and Van Beneden have proven the distinctness of this genus from *Basilosaurus*, in its much shorter cranial cavity, and posteriorly placed nasal meatus. The nasal bones are abbreviated and flattened, as in the whales, while those of the *Basilosauri* are elongate, prolonging the nasal meatus, and throwing the nares far anteriorly. The latter thus approximate the *Pinnipedia*, while the *Squalodons* are more typical Cetaceans.

The present collection contains remains to be attributed to this genus, and which will be made subjects of illustration. At present a brief notice of dental features will suffice.

A considerable amount of variation among teeth situate in different positions in the jaws of the same species, has been shown in the above mentioned essay to exist. In consequence, remains, assigned by authors to various genera, have been, with much probability, referred to the genus *Squalodon*.* The same erroneous references had also been made in this country, but to a less extent. The remains on which these, and the present notices are based, indicate much parallelism between the marine faunae of the coasts of America and Europe, during the Yorktown Epoch.

Remains of nine individuals at my disposal indicate several species of this genus. They may be compared as follows with those already known.

* Prof. Van Beneden adopts this name, and rejects that of *Basilosaurus* for Harlan's genus, probably on the ground of the ill application of the latter to a genus of mammals. The application of the name *Squalodon* is, however, even more faulty, and it has not the merit of classic composition, like *Basilosaurus*.

I. Molars with two roots.

** Premolars with short conic crowns.

Premolars compressed, cutting.

Roots of premolars compressed.....S. *protervus*.

Promolars not compressed, bent.

Size small.

Premolars with crowns bent.....S. *wymanii*.

Size large.

Extremity of mandible much recurved; alveolae superior.....S. *mento*.Extremity of mandible little recurved; alveolae lateral....S. *grateloup*ii.

** Premolars with elongate conic crowns.

Enamel of premolars smooth.

Roots of premolars very long.....S. *holmesii*.

Enamel of premolars ridged or striate.

Premolars striate; muzzle short, broad; molars serrate on both edges.....S. *ehrichii*.Premolars ridged; muzzle long, slender; molars serrate on both edges (except one or two anterior.).....S. *atlanticus*.Premolars ridged; muzzle long, slender; molars serrate only on the posterior edge.....S. *antverpiensis*.

II. Molars (or a portion of them) with three roots.

Denticles on the posterior edge only, step-like.....S. *gervaisii*.

Of the above species, the two rooted molars of *S. protervus*, *S. wymanii*, *S. mento*, and *S. holmesii* are unknown. It is, however, altogether probable, from the usual correlation with the form of the molar teeth, that there are three genera included in the preceding synopsis. Prof. Van Beneden states that probably the *S. gervaisii* will be found to pertain to an unnamed genus. Of this there is as yet little evidence, as the character of the three roots is not seen in a second molar figured by Gervais. The remaining species may be arranged as follows:

CYNORCA Cope, sp. *C. proterva* Cope.SQUALODON Grateloup, sp. *S. mento* Cope, *S. wymanii* Leidy, *S. grateloup*ii Von Meyer.COLOPHONODON Leidy, *C. holmesii* Leidy, *C. ehrlichii* Van Beneden, *C. atlanticus* Leidy and *C. antverpiensis* Van Beneden.

Lastly, may be added the gigantic ally of the above, described by Von Meyer and Van Beneden,

STENODON Van Ben. *S. lentianus* Von Meyer.

SQUALODON PROTERVUS Cope.

This species is represented in the collection by a single canine tooth, which presents the usual small crown and broad fang of the Cetacea. The fang is, however, shorter than in any homologous teeth in the other two genera above named and, with the crown, very much compressed in one plane. A shallow groove extends on each side of it to the narrowed and flattened truncate base. The tooth is widest at the middle of the fang; the crown is rapidly acuminate, narrow lenticular in section, and furnished with a rather thickened postero-internal cutting edge. The anterior or external aspect is worn away by the attrition of a corresponding tooth, but was obtuse, and furnished with a longitudinal ridge on each side at the base of the crown. The surface of the enamel is rugose, more minutely on one side than on the other. The tooth is considerably curved. While the enamel is polished, the fang is roughened and opaque.

1867.]

	In.	Lin.
Total length on middle.....	1	10.5
Length of crown.....		
Width at base of crown.....		4.5
" " middle of fang.....		5.25

The length of the root of this tooth renders it improbable that it was a transitional molar, that is, intervening between the premolars and molars. Two teeth, having crowns similarly though rather more symmetrically formed, are in the Academy Museum, and these I suspect to have occupied that position. The present is more likely to have been an elongate tooth near the position usually occupied in Mammalia by the canines. There can be little doubt that the genus *Cynorca*, to which I refer it, will turn out to be well characterized.

The tooth of a closely allied animal is figured by Giebel, *Odontographia* xxxvi, 10, 11, 14, after Von Meyer. I have not been able to find the description of it, if existing.

SQUALODON WYMANII m. *Phoca wymanii* Leidy. Proceedings Academy N. Sci. 1856, 265.

Of this, the smallest species of the genus, three premolar teeth are in the collection, and the type specimen is in the Academy's Museum. The teeth are remarkable for the abrupt posterior direction of their crowns. The roots are curved, one of them abruptly so, and flattened.

SQUALODON MENTO Cope. Cetacean, Wyman, Amer. Jour. Sci. Arts, 1850, 230-232, figs. 4, 5, 6, 7.

This species is represented by four premolar teeth. The fang in these is thickest just below the base of the crown. No. 1 has a conic slightly curved crown, oval in section; it is grooved on the sides and minutely rugose elsewhere. The fang is polished, compressed, slightly curved in two directions, and grooved on its sides, one, the strongest, on the inner side of a curve and continuous with the grooving of the crown. At the base of the crown, on the side of the groove, is as light swelling. In Nos. 2, 3 and 4 the fangs are rugose, in No. 2 more cylindrical and slightly grooved laterally with open pulp cavity. Nos. 3 and 4 exhibit this cavity closed—in No. 4 by a distinct bony plug, and their fangs are much curved. In No. 3 the crown is smaller and more conic than in No. 1; it is rugose and furnished with a delicate continuous ridge on the outer and inner borders of its incurved plane. In No. 4 the crown is as broad at the basis as No. 1, but is much less elevated, and abruptly recurved. It is subtriangular in form, and is provided with a distinct tube at the base, behind the recurvature. The anterior outline of the crown forms the quadrant of a circle; it bears a rugulose cutting ridge, which is continued from the acuminate apex over the tubercle.

	Lines.
Length No. 1.....	23.5
" " crown (restored),	7.5
" No. 3.....	25.5
" " crown.....	7.
" No. 4.....	22.5
" " crown.....	6.5
Width " " at base.....	5.25

No. 1 approximates in position the transitional molar. A tooth, perhaps occupying that place or the next, has been figured by Dr. Wyman (*Supra* fig 4), as belonging to the genus *Phocodon* Agass.* The anterior premolars and a portion of the mandible, no doubt belonging to the same species, are figured in the same place as above. They belong to an animal much smaller than that to which the teeth above described pertain, and it is a matter of some question whether these specimens do not rather relate to the *S. wymanii* Leidy. The teeth, however, do not exhibit that abrupt flexure of the crown

* It also bears much resemblance to those of the recent *Inia*.

seen in the latter species. These premolar teeth bear considerable resemblance to those of the genus *Otaria*, and explain the reference of several of the species to seals by Gervais, Leidy and others.

If the *S. mento* be as I suppose, nearly allied to the *S. grateloupii*, it differs in the more recurved extremity of the symphysis, and the more vertical direction of the teeth. This comparison is, however, based upon the determination of Van Beneden, that the mandible figured by Gervais as *Champsodelphis macrogenius* (from Leognan near Bordeaux) really belongs to the *S. grateloupii*. A portion of maxillary and premaxillary bones with teeth, said by Gervais to belong to the former, obviously does not relate to the latter; hence the probability of the existence of another species to be called *S. macrogenius*. The teeth named by Gervais as *Phoca pedronii* and *Phoca* sp. (Tab. viii f. 8) are evidently those of a species allied to *S. mento*. Relying then on Van Beneden's determination, the *S. grateloupii* is more nearly allied to the two preceding species in the lack of long conical premolars and canine-like teeth, than it is to the species included here under the head of *Colophonodon*. In the latter these weapons are of great length and strength, and the anterior, according to Van Beneden, may be called small tusks. A species still smaller than the *S. wymanii* has been described by Leidy as *Phoca debilis*, from the Pliocene of Ashley River of S. Carolina. It will no doubt be found to be allied to *Squalodon* (vid. Pr. A. N. S. Phil. 1856, 265).

SQUALODON HOLMESII Leidy M. S.* *Colophonodon holmesii* Leidy. Proceedings Academy 1853, p. 377.

The size of this species was probably near that of the *S. mento*, and smaller than that of the *S. atlanticus*. Its geologic position is supposed to be the Pliocene, while the other species of the genus have been discovered in Miocene beds. It is, therefore, not represented in Thomas' collection.

SQUALODON ATLANTICUS Leidy MS. *Macrophoca atlantica* Leidy, Proceed. Acad. 1856, 220.

Remains of three individuals of this species before me indicate considerable variety in the forms of the two rooted molar teeth.

The individual from which Leidy determined the species is represented by only three true molars. Of these, the posterior, with more curved and divaricate fangs, is smaller, and presents four crests behind, and two in front. The next presents the same number of crests, with the addition of a basal rudimentary one in front. In the other molar, which has a slightly more elongate crown, three and a rudiment may be counted behind, and none in front.

The second individual is represented in the Thomas collection by the proximal portions of the maxillary bones of both sides, and seven molar teeth in place. At least four of the most posterior molars were inserted in oblique alveolæ, overlapping by their anterior fang the inner face of the posterior fang of the tooth in front. Anterior to these the alveolæ are less oblique, and separated by spaces. The palatal face is moderately convex, while the external surface is divided into two plane faces by an angulated line, which is strong posteriorly, vanishing anteriorly. These bones indicate a muzzle of proportions similar to those of the *S. antverpiensis* Van Beneden, and a cranium of thirty inches in length.

The teeth themselves, from their entire absence of worn surfaces, may be supposed to belong to a young individual. They are longitudinally wrinkled, and present a thick anterior and posterior cutting edge. The serrulations stand from behind, $\frac{3}{2}$ $\frac{2}{2}$ $\frac{3}{2}$ $\frac{3}{2}$, the anterior two of the last being very weak. The cutting edge of all these is serrulate. Not only in the number of the crests, but in the more elevate conic apex, do these teeth differ from those of the foregoing individual.

* Prof. Leidy informs me that he has arranged this and the succeeding species in the genus *Squalodon* in the MSS. of his work on North American extinct mammalia.

The third individual is represented by one true molar, and two caniniform premolars. The former is considerably smaller and more conic than the others, and exhibits a minute knob only on its anterior edge, to represent a crest. On the posterior aspect there have been three crests on the basal three-fifths the crown, worn off by mastication. The fangs are connected by a thin lamina, as in the second described specimen, and not, as in the first, by a thick wall.

One canine is larger and with perfect root; the other smaller, a little more compressed, and without fang; it exhibits a rather large conic pulp cavity. The fang of the first is one-third longer than its crown; it is slender, slightly compressed conic, and without cavity at the extremity. The crown is coarsely striate and rugose between the striæ; two of the latter are elevated into obtuse anterior and posterior cutting edges. Diameter greatest at base of crown; latter slightly curved.

	In.	Lin.
Length of basis of large molar of No. 1.....	13	
Height of enamel of same.....	10	
“ “ “ in No. 2.....	13	
Length bases of 2, 3 and 4 molars (from behind), No. 2.....	3	4.5
Width palatine face at 3d molar, No. 2.....	3	8.75
Length canine, No. 3.....	4	
“ fang of do.....	2	4.5
“ basis of molar crown, No. 3.....	11	
Height of “ “ “ “.....	9	

No. 1 was discovered in the miocene of New Jersey; the others were in the Thomas collection.

The question arises as to the specific identity of these individuals. The molar of No. 3 at once suggests a species different from No. 2 in smaller adult size, and lack of anterior denticles. It could not be considered as a transitional molar. These are shown by Van Beneden to be premolars, which assume traces of the characters of the true molars. The present tooth, in its form and double fang, is evidently a true molar. The discovery of the tooth of No. 1 without denticles, however, invalidates this peculiarity as a ground of difference in the present case, and furnishes a character of the species. Those whose dentition is known exhibit an abrupt commencement of characteristic true molars, without material approximation in the forms of their crowns to those of the premolars. The shorter apex and increased number of denticles on the posterior face in the specimen No. 1, I regard as an individual peculiarity.

The question as to the identity of this species with the *Sq. grateloup* depends in part on the identification of various short crowned teeth, described by Gervais as its premolars. The strong median angulation of the external face of the posterior part of the maxillaries, is a feature not described or figured as existing in the latter species. The affinity of the *S. atlanticus* is really nearer to the *S. antverpiensis* of Van Beneden, if it be not the same. The only characters which I can at present assign as distinctive, are the absence of denticles on the anterior edge of the molars throughout the series, and the non-overlapping of the four posterior of these teeth. The general proportions of the jaws and the form of the canine premolars are very similar in the two species. If, as I suppose, my description of No. 2 is taken from a young animal, its adult dimensions will exceed those of the *S. antverpiensis*.

DORYODON Gibbes.

Proc. Acad. Nat. Sci. Philada. 1845, 254. *Pontogeneus* Leidy, op. cit. 1853, 52.

This genus has been regarded as identical with *Basilosaurus* by Professor Müller, if, as is stated by Müller, l. c. (and Bronn, *Lethæa Geognostica*), the

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species described by the former author is congeneric or identical with that described by Gibbs. Authors generally seem to have settled down to the belief in the identity of the two genera, the only exception being Prof. Van Beneden, who, in his essay on *Squalodon*, doubts the generic identity of *Basilosaurus macrospondylus* and *B. brachyspondylus* of Müller. Enough is now known of the Cetacea to render it certain that these two species cannot belong to the same genus, the elongate form of the dorsal vertebræ of the true *Basilosaurus cetoides* sufficiently characterizing that genus, as compared with the more usual Cetacean form of those of the present type. This feature was, however, not known to Gibbs, who endeavored to establish the genus on the hollowness of its teeth,—a character dependent, perhaps, on development.

DORYODON PYGMÆUS Cope. *Zeuglodon pygmæus* Müller, Ueber die Zeuglodonten, Berlin. *Pontogeneus ? priscus* Leidy, op. cit.
Eocene. Louisiana, Alabama.

DORYODON SERRATUS Gibbs, l. c. *Basilosaurus serratus* Gibbs, Journ. Acad. i. 10. ? *Zeuglodon brachyspondylus* Müller, Ueber d. Zeuglodonten, 1849, 26. Tab.
Eocene. Alabama, South Carolina.

BASILOSAURUS Harlan.

Trans. Amer. Philos. Soc. Philada. 1834. *Zeuglodon* Owen, Trans. Geolog. Soc. London, 1839.

BASILOSAURUS CETOIDES Geinitz, Unters. ueber *Hydrarchus*, Dresden, 1847 (cum Carus et Reichenbach), Gibbs, Jour. Acad. Nat. Sci, 1847, 1.
Eocene. Arkansas, Alabama.

Supplement.

In the same collection are portions of mandibular rami of two species of terrestrial Mammalia, which would not appear to be referable to the same stratigraphic horizon. No beds regarded as postpliocene have as yet been indicated from the shores of the Patuxent, though the below-mentioned species have been most probably derived from such a deposit. These, with the other beds of other epochs, are buried under from ten to thirty feet of rather fine gravel drift.

DICOTYLES TORQUATUS Cuvier.

Portions of both rami of the mandible with permanent and deciduous molars and canines of a small individual. The former are similar to those described by Leidy in Palæontology of South Carolina, by Prof. Holmes, and closely resemble those of the common Peccary. They lack, however, the cingulum crossing the interspace between the external pair of tubercles.

GALERA MACRODON Cope, sp. nov.

This species is based on the greater portion of the right ramus of the mandible of an adult, containing three molars in place, the alveolæ of the first and of the last, with a considerable portion of that of the canine.

The alveolus indicates a canine of large size. The basis of first premolar is turned obliquely outwards, and is two-rooted. The second and third premolars are separated by a space; they have well-marked cingula, but neither posterior nor internal tubercles. The sectorial is elongate, more than twice as long as wide, the inner tubercle well marked, acute, the posterior lobe flattened, elongate; anterior lobe narrowed. Alveolus of the tubercular molar longitudinal, receiving a flattened fang with a groove on each side. Inferior face of ramus below anterior line of coronoid process, broad rounded, turned outwards. Masseteric ridge only reaching the latter below near the apex of the 1867.]

coronoid process, and not extending anterior to the line of the posterior margin of the tubercular molar. Ramus narrow at first premolar.

	In.	Lin.
Length of ramus from posterior margin canine to do. of tubercular.....	1	5.5
“ to posterior margin sectorial.....	1	3
“ third premolar.....		3.75
“ sectorial molar.....		6
Width of same (posterior lobe) ..		2.8
Depth ramus at posterior margin first premolar.....		7.5
“ “ “ sectorial.....		8.25
Width “ “ symphysis.....		4.5

This species appears to have been perhaps rather larger than the *Galera barbata* (Gray) of Brazil, and of a rather more slender muzzle. As compared with that species, it exhibits many peculiarities. The third premolar is smaller, and the first, the sectorial, and the tubercular relatively larger. In *G. barbata* the first molar has but one root, and the mandibular ramus thicker and deeper. The masseteric ridge advances to opposite the middle of the sectorial molar, and is continued on the inferior margin of the ramus, much anterior to its position in the *G. macrodon*.

The discovery of this species adds another link to the evidence in favor of the extension of neotropical types* over the nearctic region during the post-pliocene epoch. Of thirty continental North American species enumerated by Leidy (Ancient Fauna of Nebraska, 9), all but thirteen may be said to be characteristic of that, or closely allied to the species of the present period of North America. Of the thirteen, one (*Elephas*) is characteristic of the old world, of one (*Anomodon*) affinities unknown, and eleven are represented by members of the same family or genus now living in South America.

Among marine vertebrata, as among molluscs, the equivalency with the European beds of the same age is much closer. The following parallels exhibit this relation:

<i>North American.</i>	<i>European.</i>
<i>Aëtobatis arcuatus</i> ,	<i>Aëtobatis arcuatus</i> ,
<i>Myliobatis pachyodon</i> ,	<i>Myliobatis reglianus</i> ,
<i>Raja dux</i> ,	<i>Raja ornata</i> ,
<i>Plagiostomi</i> sp.,	<i>Plagiostomi</i> sp.,
<i>Priscodelphinus grandævus</i> ,	<i>Priscodelph. canaliculatus</i> ,
<i>Balæna palæatlantica</i> ,	? <i>Balæna lamanoni</i> ,
<i>Squalodon mento</i> ,	<i>Squalodon grateloupii</i> ,
<i>Squalodon atlanticus</i> ,	<i>Squalodon antverpiensis</i> .

On the genera of Fresh-water Fishes *HYPHILEPIS* Baird and *PHOTOGENIS* Cope, their species and distribution.

BY E. D. COPE.

The two genera in question are among those represented by the greatest number of individuals in the streams of the eastern district (*i. e.*, east of the Rocky Mountains) of our continent. *Hypsilepis* is distributed over the greater part of this area, while *Photogenis* abounds most in the Allegheny region, and always in the streams flowing through the Mississippi valley, as no species is known to occur in an Atlantic water. As we proceed northwards, the latter genus disappears with many others, one after another, while *Hypsilepis* still remains, and with its largest forms peoples the waters of the Great Lakes and the St. Lawrence.

* The genus *Galera*, Gray, is here regarded as distinct from *Galeitis* Bell (*Grisonia* Gray), as it possesses an internal tubercle on the inferior sectorial, which is wanting in the latter.